

CLAIMS

What is claimed is:

1. A notification system, comprising:
an information herald that presents summarized notifications; and
an information controller that receives attentional inputs associated with a user to dynamically generate the information herald on one or more display screens in order to facilitate user processing of the summarized notifications.
2. The system of claim 1, the information controller receives inputs regarding user activities and employs one or more attention models to generate one or more dynamic outputs to control information provided to users at a workspace.
3. The system of claim 2, the information herald operates at various locations in the workspace and receives dynamically adjustable data from the information controller in order to provide notifications to users in a non-distractive and unobtrusive manner.
4. The system of claim 2, the information controller provides attention-sensitive placement and configuration of the information herald based on a user's activity via the attention models or other inputs about focus of visual attention including gaze and pose information.
5. The system of claim 1, the information controller removes after some threshold time or fades the information herald from view over time.
6. The system of claim 1, the information herald provides more detailed information when a user selects the information herald via an input command.
7. The system of claim 6, the input command includes at least one of a keystroke, mouse click, a mouse hover, and voice command.

8. The system of claim 1, the information controller includes controls for timing out after a wait period, allowing users to continue to work with or without a glance at the information herald.
9. The system of claim 8, the information controller processes an implicit signal from users that they are not interested by information presented in the information herald without requiring an explicit user action.
10. The system of claim 1, the information controller includes at least one of a dynamic positioning control, a dynamic sizing control, a dynamic content control, a dynamic rendering control, a dynamic audio control, a dynamic timing control, and a dynamic fading control.
11. The system of claim 10, the dynamic rendering control is employed for changing the appearance of the information herald or content therein, the appearance including at least one of colors, shapes, and fonts.
12. The system of claim 1, the information herald is dynamically adjusted to an iconic form based upon the summarized notification or an action by the user.
13. The system of claim 1, the summarized notifications include at least one of a line of message, a message chunk, and a message outline.
14. The system of claim 1, the information herald is dynamically located near a user's focus of attention.
15. The system of claim 1, the information herald is dynamically positioned based upon an automatically determined urgency value for a notification.

16. The system of claim 1, further comprising an audio herald that is controlled by the information controller using auditory cues that represent the urgency of an incoming message.
17. The system of claim 16, the information controller only uses the audio herald, or adds an audio cue when no user is detected.
18. The system of claim 1, the information controller employs a dwell time for the information herald that can be shortened or lengthened depending on where the herald is being displayed or the user's workload.
19. The system of claim 18, the information herald is appended to a herald journal or folder after a predetermined time that allows a user to inspect the information herald at a later time.
20. A computer readable medium having computer readable instructions stored thereon for implementing at least one of the information herald and the information controller of claim 1.
21. A system that facilitates message processing by a user, comprising:
 - means for automatically prioritizing a message;
 - means for summarizing the message; and
 - means for dynamically locating the message in a user's workspace.
22. The system of claim 21, further comprising means for analyzing the user's activities in order to dynamically locate the message.

23. A method for automatically notifying a user, comprising:
 - automatically determining an output region for a message;
 - automatically placing the message in the output region;
 - automatically placing the output region in a default region of a workspace; and
 - dynamically moving the output region based upon a user's detected activities.
24. The method of claim 23, further comprising automatically assigning a priority to the message.
25. The method of claim 24, further comprising automatically moving the output region based upon the priority.
26. The method of claim 24, automatically changing the appearance of the output region based upon at least one of the priority and the user's detected activities.
27. The method of claim 23, further comprising automatically applying at least one control to dynamically change the output region, the at least one control associated with at least one of a position, a size, a content, an appearance, a sound, and a time.
28. The method of claim 23, further comprising automatically summarizing the message.
29. The method of claim 23, further comprising automatically moving content associated with the output region to an electronic journal.
30. The method of claim 1, the detected activities are determined in accordance with a model.

31. The method of claim 30, the model processes at least one of, a location, a visual pose, a calendar, a time, an appointment status, an acoustical signal, an application in focus, an inspection interval, an application usage pattern, and user device activity to determine an attentional focus of a user.
32. A method for controlling notifications to a user, comprising:
 - monitoring a user's activities;
 - constructing an attention model to analyze the user's activities; and
 - dynamically placing information alerts within a workspace based at least in part on output generated from the attention model.
33. The method of claim 32, the attention model infers a cost of different types of interruptions given that a user is of a particular attentional state.
34. The method of claim 33, the attention model analyzes a utility, $u(D_i, A_j)$, capturing a cost of a user in an attentional state A_j being disrupted by a task or communication event D_i .
35. The method of claim 34, the cost is assessed as a willingness to pay to avoid a disruption in dollars for a respective combination of disruptions.

36. The method of claim 34, further comprising computing an expected cost of interruption (ECI) by summing over utilities, weighted by a likelihood of respective states of attention, conditioned on a stream of incoming sensory information, wherein ECI is stated as:

$$ECI = \sum_j p(A_j | E) u(D_i, A_j)$$

wherein $p(A_j | E)$ is the probability of an attentional state, conditioned on an evidence stream E .

37. A method for controlling notifications to a user, comprising:
 - monitoring a user's activities;
 - providing one or more user controls to guide a herald; and
 - dynamically controlling the herald based at least in part on the user's activities and the user controls.
38. The method of claim 37, further comprising providing an entry point into the herald for decisions about heralds including positioning and rendering of the heralds.
39. The method of claim 37, further comprising providing a particular region or button with the herald that allows entry into controls for adjustment in general or for the case at hand.
40. The method of claim 37, the control provided as a rich control panel for specifying preferences about heralds.
41. The method of claim 37, further comprising controls for opening and closing complex structures associated with the herald.

42. The method of claim 37, the controls include general gestures that enables users to ignore the herald for a time period.
43. The method of claim 43, the controls are coupled with a "snooze" feature, allowing user to indicate a predetermined period for the herald to return.
44. The method of claim 37, the herald is dynamically positioned based upon an urgency associated with a message.
45. The method of claim 37, further comprising automatically providing a list of heralds that have been missed while a user has been detected to be away.
46. The method of claim 45, further comprising providing a time-out function based upon a determined importance of the heralds appearing in the list of herald.
47. The method of claim 46; further comprising sorting important heralds into a first folder and time-out heralds in a subsequent folder.
48. The method of claim 37, further comprising automatically analyzing spatial and temporal constraints that are based on a type of software application, a configuration of displayed information associated with the application, or current or recent specific interactions with application content.
49. The method of claim 48, the constraints are employed to ensure that a herald does not obfuscate important content or disrupt a current interaction and to minimize the disruptiveness of a rendering of the herald.

50. The method of claim 48, further comprising automatically positioning a keep out area over selected portions of a user's display or displays to ensure that a herald is not placed in a position that will overlay a position where a user is currently working.
51. The method of claim 50, further comprising processing a user's current activity and providing a brief temporal keep out area that is applied to delay a herald rendering.